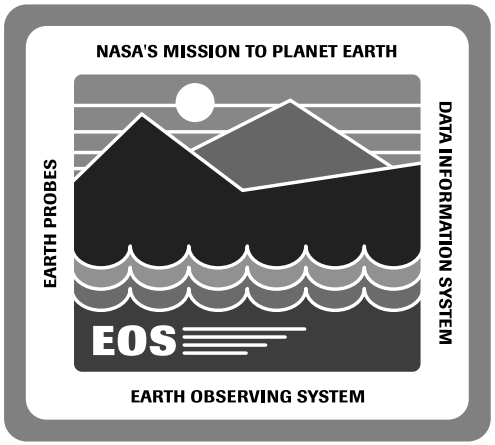


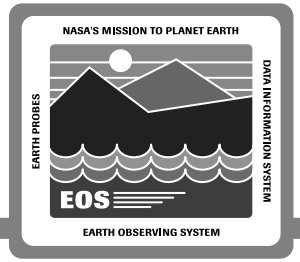
Integration and Test Planning

Doug O'Neill

dougo@eos.hitc.com

ECS Release A SDPS/CSMS Critical Design Review
17 August 1995

Agenda



Changes Since PDR

- **I&T Reorganization**

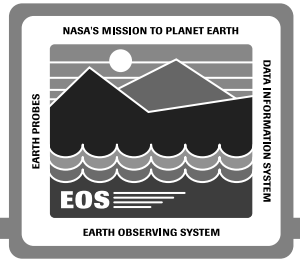
Current I&T Status

- **Segment versus System Test**
- **Test Planning, Environment , Tools, Data and EP6 I&T**
- **I&T Involvement in Release A Detailed Design**

Where We Go From Here

- **Test Procedures and Workshops**

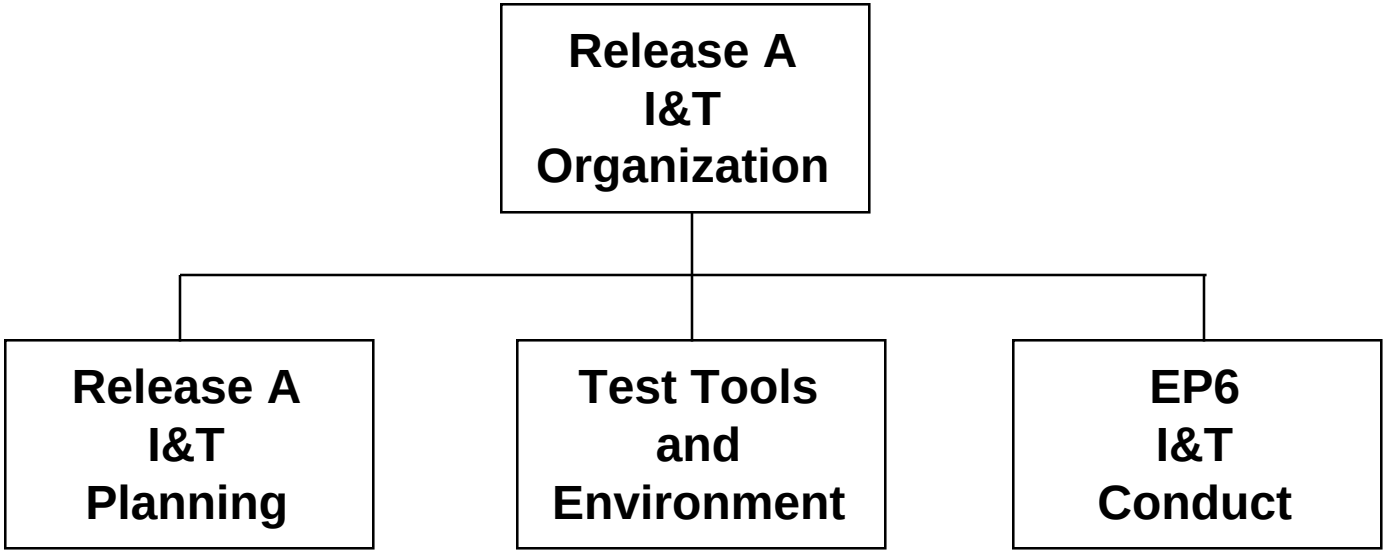
Changes Since PDR



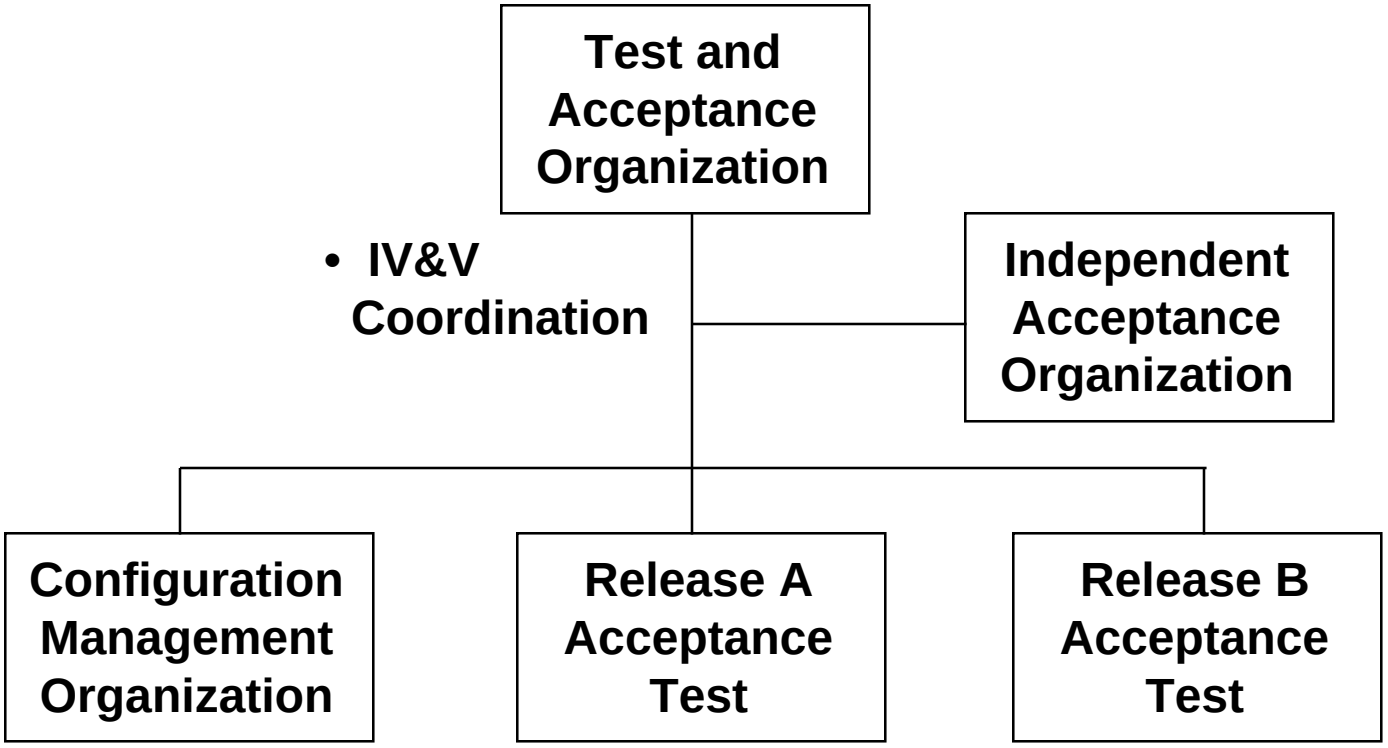
I&T Reorganization

- **Release I&T Organizations created to focus on achieving release schedules**
- **System I&T and Segment I&T organizations combined to reduce schedule risk associated with two software handoffs**
  - **Segment and System I&T scope remains but consolidation into a single organization allows improved efficiencies and focus (e.g., Test Plan Consolidation and Refinement)**
- **Realtime Integration Test System (RITS) moved to Release A I&T to focus on Release A Test Tools & Environment**

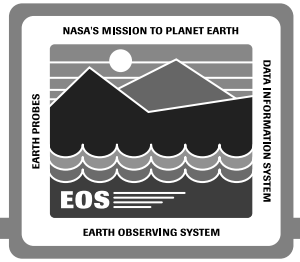
Release A I&T Organization



Test & Acceptance Organization



Segment vs. System I&T

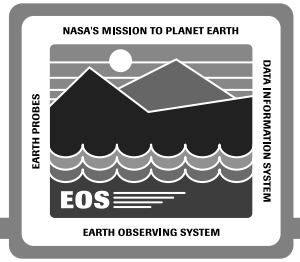


Release A I&T Organization will conduct both Segment and System I&T

Segment I&T Focus Areas

- **Integration of Units (Object Classes) into CSCs, CIs, Subsytems and Release**
- **Verification of CIs to Level 4 Functional and Performance Requirements**
- **Validation of CI Design and Implementation**
- **Validation of Interface Implementation and Operations Between CIs**

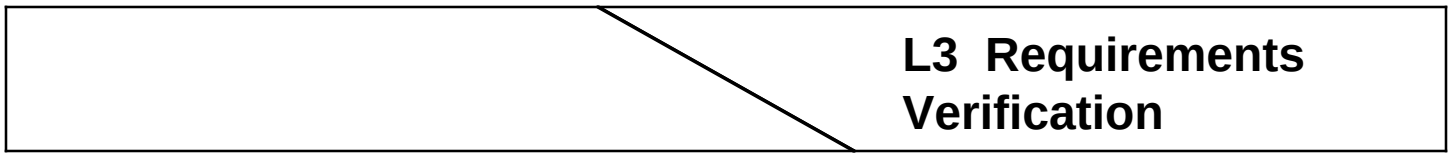
Segment vs. System I&T (Cont)



System I&T Focus Areas

- **Verification of Release to Level 3/RBR Functional and Performance Requirements**
- **End-to-End Function and Performance (& Stress) Testing**
- **End-to-End Scenarios (e.g., Data Push, Data Pull)**
- **Operationally Oriented Testing**
  - **Normal DAAC Operations - “Day in the Life of ECS”**
  - **ECS Wide & DAAC Fault/Failure Handling - “Bad Day in the Life of ECS”**
  - **DAAC Unique Configurations/Operations**
    - **Within the available EDF Resources**

Overlap Between System & Segment I&T



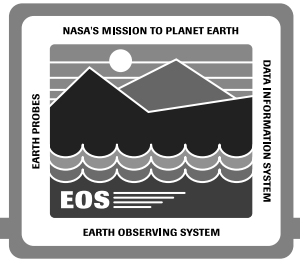
Some "mixing" of requirements verification activities is expected to occur by eliminating redundant test activities

- **i.e., more detailed Level 3 requirements may be verified in the same test cases as equivalent level of detail Level 4 requirements**

Mixed verification activities will be handled at the highest level of formality

- **any test case which verifies Level 3 requirements will be considered as system test case**
- **control level and delivery dates of documentation, review cycles, and test witnessing will adhere to system test policies**

Integration and Test Planning



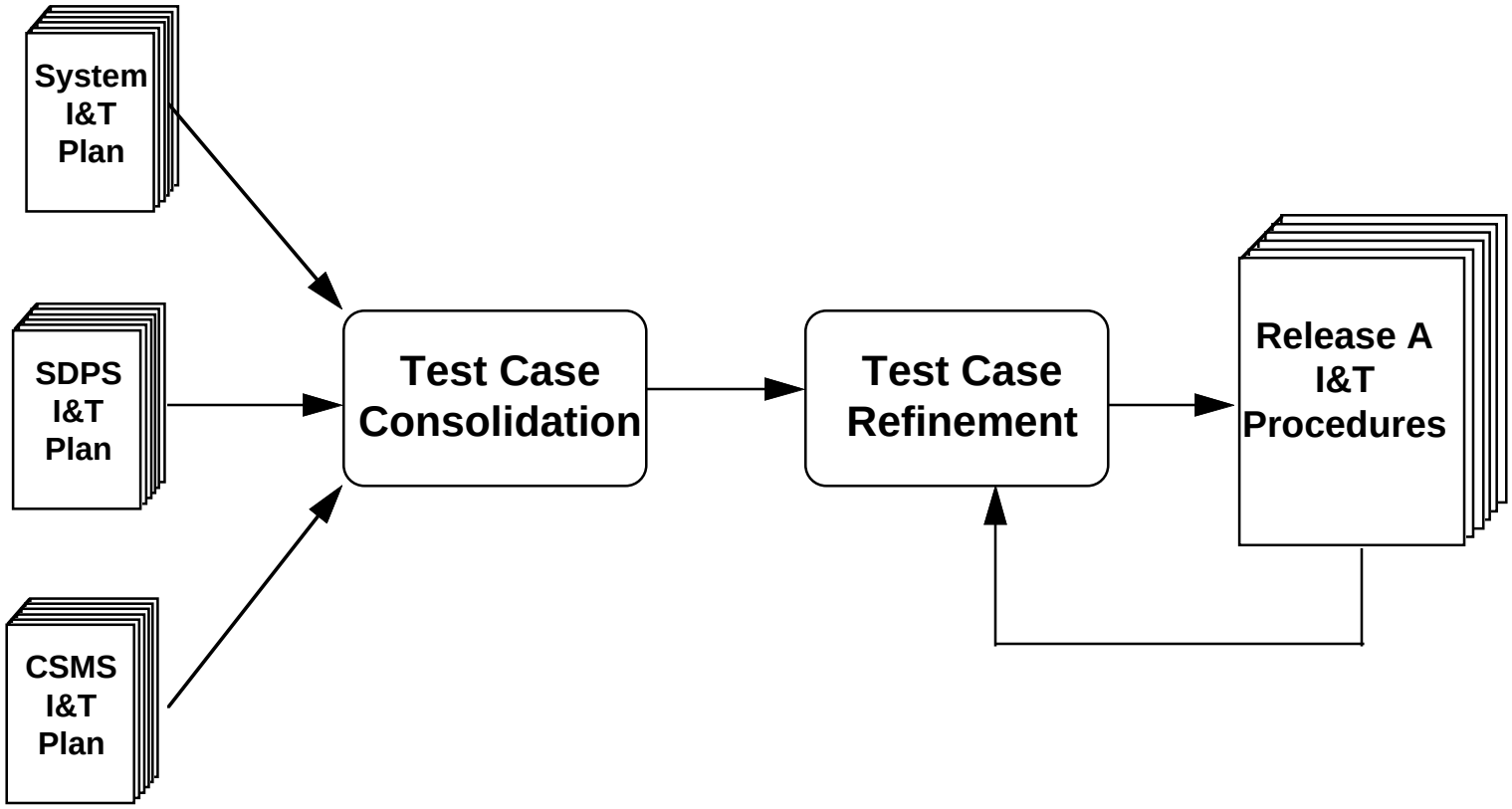
Test Case Consolidation

- **Identified redundant test cases in System and Segment I&T Plans**
- **Consolidated redundant test cases and remapped requirements**

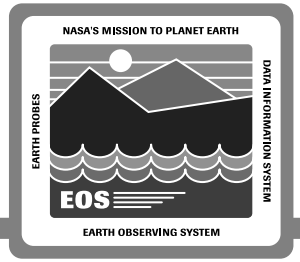
Test Case Refinement (Ongoing)

- **Refine test cases to focus more on low-level integration activities and tests in "segment test cases" and more on high-level, end-to-end tests in "system test cases"**
- **Refine test cases based on CDR information, e.g., additional design details available, new or modified requirements, implementation plan**
- **Incorporate comments from ESDIS, IV&V, and Test Workshops**
- **New test cases will be incorporated in Test Procedures CDRL with mapping from approved test plans to new test cases**

Release A Test Case Consolidation and Refinement



Test Tools and Environment



Test Data

- **Developed consolidated list of data required to support I&T**
- **Coordinating list with IATO, as appropriate**
- **Coordinating with ESDIS, MTPE (Skip Reber), external systems, DAACs, science teams, etc. to determine data availability**
- **Producing requirements for test data that must be generated or modified in-house**
  - **e.g., XTE data modified for use in Ir1 testing due to similar format to TRMM data**

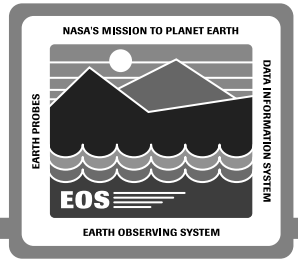
Test Tools and Environment

- **Supported definition of EDF COTS testbed**
- **Modifying SDPF simulators to support Ir1/Release A testing**
- **Generating requirements and design for all Release A simulators**
- **Generating requirements and design for Test Management Tool**

Sample of Test Data Table

TRMM Release (Release A)											
Instrument	Platform	Ext. I/F(Source)	Processing Site	Archieving Site	Product Level	Product	File Format	Data Format	Header Format	Volume	Notes
n/a	TRMM	SDPF/TSDIS	n/a	n/a	Message	Authentication Request	PVL	ASCII	n/a		
						Authentication Response	PVL	ASCII	n/a		
		SDPF/TSDIS	n/a	n/a	Message	Data Availability Notice(DAN)	PVL	ASCII	n/a		
						Data Availability Acknoledgment(DAA)	PVL	ASCII	n/a		
		SDPF/TSDIS	n/a	n/a	Message	Data Retrieval Request(DRR or DR)	PVL	ASCII	n/a		
						Data Retrieval Validation Response(DRV or DVR)	PVL	ASCII	n/a		
		SDPF/TSDIS	n/a	n/a	Message	Data Delivery Notice(DDN)	PVL	ASCII	n/a		
						Data Delivery Acknoldgment(DDA)	PVL	ASCII	n/a		
Instrument	Platform	Ext. I/F(Source)	Processing Site	Archieving Site	Product Level	Product	File Format	Data Format	Header Format	Volume	Notes
n/a	n/a	NESDIS/NMC	n/a	n/a	Message	Authentication Request	PVL	ASCII	n/a		
						Authentication Response	PVL	ASCII	n/a		
		NESDIS/NMC	n/a	n/a	Message	Data Availability Notice(DAN)	PVL	ASCII	n/a		
						Data Availability Acknoledgment(DAA)	PVL	ASCII	n/a		
		NESDIS/NMC	n/a	n/a	Message	Data Retrieval Request(DRR or DR)	PVL	ASCII	n/a		
						Data Retrieval Validation Response(DRV or DVR)	PVL	ASCII	n/a		
		NESDIS/NMC	n/a	n/a	Message	Data Delivery Notice(DDN)	PVL	ASCII	n/a		
						Data Delivery Acknoldgment(DDA)	PVL	ASCII	n/a		
Instrument	Platform	Ext. I/F(Source)	Processing Site	Archieving Site	Product Level	Product	File Format	Data Format	Header Format	Volume	Notes
CERES	TRMM	SDPF	LaRC	LaRC	Level-0	Housekeeping	CCSDS SFDU	CCSDS AOS	PVL/Detached		Multiplexed
						Science	CCSDS SFDU	CCSDS AOS	PVL/Detached		
						Quick Look	CCSDS SFDU	CCSDS AOS	PVL/Detached		
LIS		SDPF	MSFC	MSFC	Level-0	Housekeeping	CCSDS SFDU	CCSDS AOS	PVL/Detached		Multiplexed
						Science	CCSDS SFDU	CCSDS AOS	PVL/Detached		
						Quick Look	CCSDS SFDU	CCSDS AOS	PVL/Detached		

EP6 I&T Conduct



EPs I&T follows a streamlined process for Integration and Test

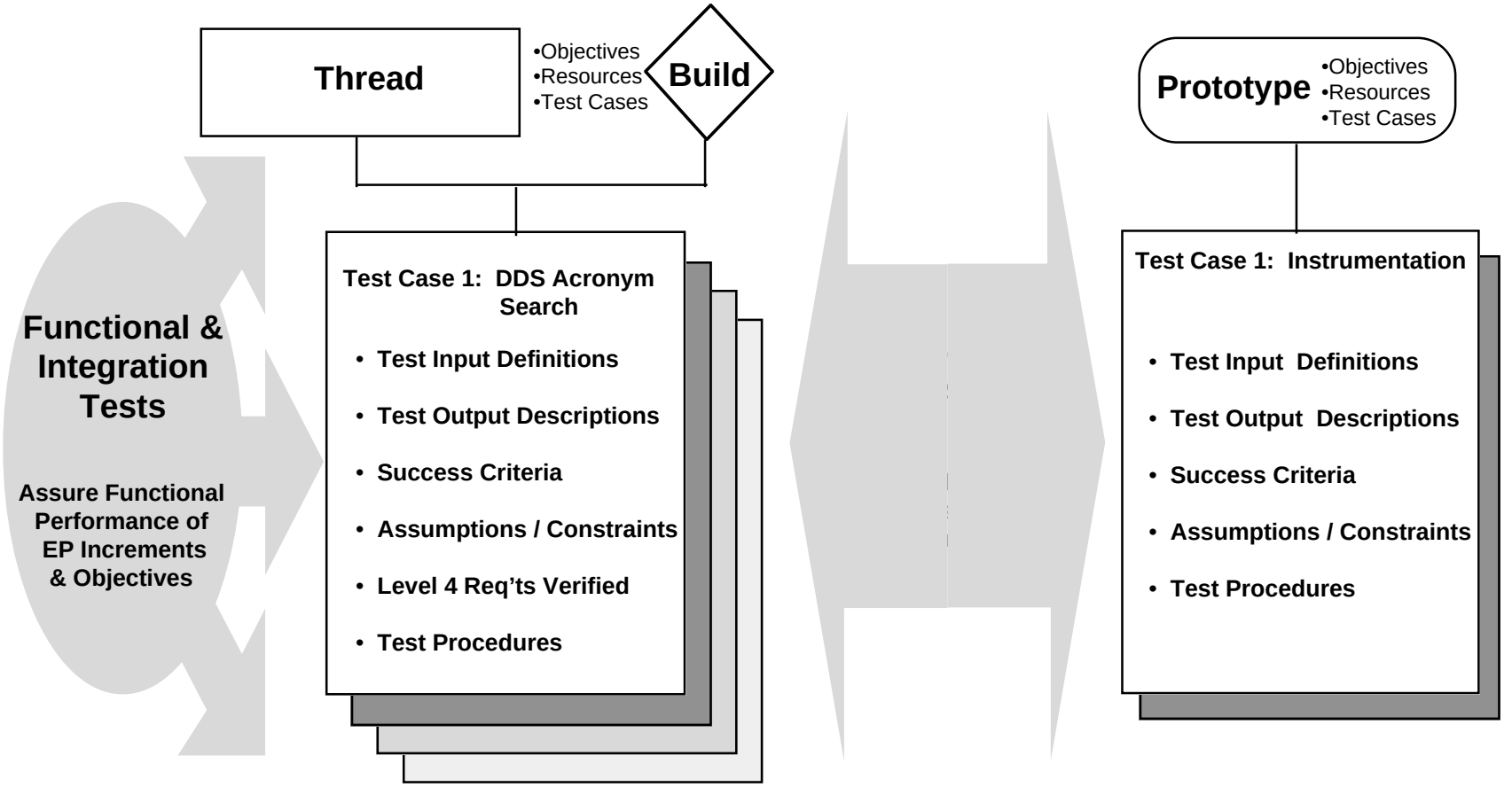
- **EPs require rapid development and fielding of functionality to allow time for feedback and product evolution**
- **Final verification will occur as components migrate to formal track integration**
- **Emphasis on functionality, stability, and quality of presentation**
- **Employs Thread/Build methodology tailored for incremental track components and prototypes**
- **Streamlined documentation process**
  - **Test Plan/Procedures and Reports Notebooks**
- **This process has evolved throughout the EPs and was used in EP4**

EP6 Completed Design Review 8/11/95

- **Preliminary Test Plan/Procedures and Thread/Build Plan completed**

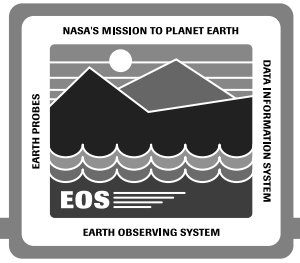
EP6 I&T Conduct starts 8/30/95 and ends by the EP6 RRR 11/17/95

EP6 I&T Process



Thread *- a set of components (software, hardware, and data) and operational procedures that implement a function or set of functions.*
Build *- an assemblage of threads to produce a gradual buildup of system capabilities. Builds are combined with other builds and threads to produce higher level builds.*
Prototype *- focused rapid development of specific system aspects which may advance evolutionary change.*

I&T Involvement in Detailed Design



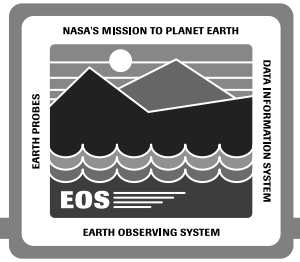
One CDRL delivery from Test for CDR

- **DID 404 "Procedures for Control of Unscheduled Activities During Verification" generated by Test and Acceptance Organization**

Concurrent Engineering - I&T has been involved in the design process to design in quality and ensure testability

- **Participated in ECS design review, inspections, teleconferences, ops workshops, requirements refinement, etc.**
- **Participated in External Interface and Ground System Test working groups**
- **Leading development of Release A Implementation Plan**
  - **Component implementation plans and I&T Threads/Builds tightly coupled**
  - **Schedule feasibility based on development, integration, and test schedules and resources**

Test Procedures and Workshops



System and Segment Test Procedures will be combined

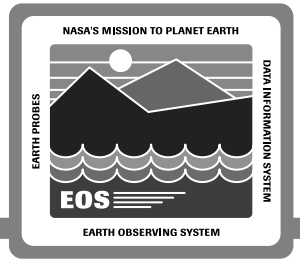
1st Preliminary Test Procedures November 15

- **Revised Threads/Builds based in current implementation plan**
- **Test case consolidation and refinements due to reorganization, CDR, and comments received on test plans**
- **Workshop to follow with ESDIS and IV&V to review I&T approach, ensure requirements coverage and address comments received on test plans**

2nd Preliminary Test Procedures due at TRR (6/1/96)

- **Contains completed procedures for all segment test cases**

Test Procedures and Workshops (Cont)



Final Test Procedures due RRR - 2 months (TBD)

- **Contains completed test procedures for all system test cases**
- **Propose User/DAAC workshop or teleconference held no later than ETR to refine DAAC specific and user oriented scenarios incorporated in system test cases**

Redlined Test Procedures delivered as required with Test Report